

**REMARKS**

Claims 1-15 are currently being cancelled in lieu of new claims 16-29, which further particularly point out and distinctly claim the subject matter which Applicant regards as the inventive subject matter. These amendments do not introduce new matter within the meaning of 35 U.S.C. §132. Accordingly, entry of the amendments prior to examination is respectfully requested.

**Information Disclosure Statement**

The Office Action states,

U.S. Patent No. 5,625,016 to Shiffino, et al. (page 1) was not considered because the patent has been withdrawn.

**RESPONSE**

Applicant has submitted a copy of Shiffino, et al. (U.S. Patent 5,625,016) herein with the accompanying Supplemental Information Disclosure Statement.

**1. Objection of Claims 1, 6, 11, 13, and 14**

The Office Action states,

Claims 1, 6, 11, 13, and 14 are objected to because of the following informalities: Please replace "molar mass distribution" with "molecular weight distribution" and delete " $M_n$ ." The symbol is understood in the art to mean number average molecular weight, not molar mass. Appropriate corrections are required.

**RESPONSE**

Claims 1, 6, 11, 13, and 14 have been cancelled rendering the above rejection moot. Notwithstanding, "A fundamental principle contained in 35 U.S.C. 112, second paragraph is that applicants are their own lexicographers. They can define in the claims what they regard as their invention essentially in whatever terms they choose so long as any special meaning assigned to a term is clearly set forth in the specification." See MPEP § 2111.01 III and § 2173.01. Applicant believes the phrase "molar mass distribution" expressed by formula  $M_w/M_n$  is properly defined in the specification and claims, and that one skilled in the art would appreciate the metes and bounds thereof. Accordingly, Applicant kindly requests the Examiner to withdraw this objection.

**2. Objection of Claim 4**

The Office Action states,

Claim 4 is objected to because of the following informalities: please replace the tradename, Crystaf®, with "crystallization analysis fractionation (CRYSTAF)", or if parent claim 1 has been amended as suggested in paragraph 4, see below, the tradename may simply be replaced with "CRYSTAF." Appropriate correction is required.

**RESPONSE**

Claim 4 has been cancelled rendering the above rejection moot. Notwithstanding, Applicant has amended the claims to replace Crstaf® with "crystallization analysis fractionation (CRYSTAF)", or

reference thereto.

Accordingly, Applicant kindly requests the Examiner to withdrawal this objection.

### 3. Objection of Claim 9

The Office Action states,

Claim 9 is objected to because of the following informalities: Please replace "polymerized onto it" with "polymerized onto said catalyst system" as it is not entirely clear which material is the antecedent of the pronoun, "it." Also, the mass ratio needs to be defined clearly. It appears that the mass ratio is that of catalyst system to polymer, but it could be mass ratio of inert support to polymer. Clarification is required.

### **RESPONSE**

Claim 9 has been cancelled rendering the above rejection moot. Notwithstanding, new claim 23 recites in part, "and linear C<sub>2</sub>-C<sub>10</sub>-1-alkenes polymerized onto the catalyst system, wherein the catalyst system to polymer polymerized onto the catalyst system is in a mass ratio of from 1:0.1 to 1:200."

Accordingly, Applicant kindly requests the Examiner to withdrawal this objection.

### 4. Objection of Claim 10

The Office Action states,

Claim 10 is objected to because of the following informalities: Please select "polymerizing" or "copolymerizing." Use of both words in the claim is superfluous. Appropriate correction is required.

**RESPONSE**

Claim 10 has been cancelled rendering the above rejection moot. Notwithstanding, Applicant has deleted the term "polymerizing" such that new claim 24 recites in part, "A process comprising copolymerizing ethylene with  $\alpha$ -olefins. . . ." with the understanding that no subject matter has been relinquished by this amendment.

Accordingly, Applicant kindly requests the Examiner to withdrawal this objection.

**5. Rejection of Claims 1-6 and 11-15 Under 35 U.S.C. §112, Second**

**Paragraph**

The Office Action states,

Claims 1-6 and 11-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims describe a side chain branching property that is not elucidated sufficiently by the claim language, and therefore, the claim is rendered vague and indefinite. Qualification of the property by citing the source of or type of measurement from which the property is derived is suggested. For instance, one may insert "as determined by crystallization analysis fractionation (CRYSTAF)" or some similar phrase after the word "distribution."

**RESPONSE**

Claims 1-6 and 11-15 have been cancelled rendering the above rejection moot. Notwithstanding, new independent claims 16, 20, 25,

27, and 28 recite in part, "as determined by crystallization analysis fractionation (CRYSTAF)."

Accordingly, Applicant respectfully requests the Examiner to withdraw this rejection.

**6. Rejection of Claims 6-8 and 15 Under 35 U.S.C. §102(b)**

The Office Action states that claims 6-8 and 15 are rejected under 35 U.S.C. §102(b) as being anticipated by Wang (WO 01/92346).

In particular, the Office Action states,

Wang teaches a catalyst and use of the catalyst in a process of polymerizing ethylene and  $\alpha$ -olefin (claims 7 and 12). The bridged complex, (2-pyridylmethyl)(Ind)CrCl<sub>2</sub> is representative (example 5).

**RESPONSE**

Claims 6-8 and 15 have been cancelled rendering the above rejection moot.

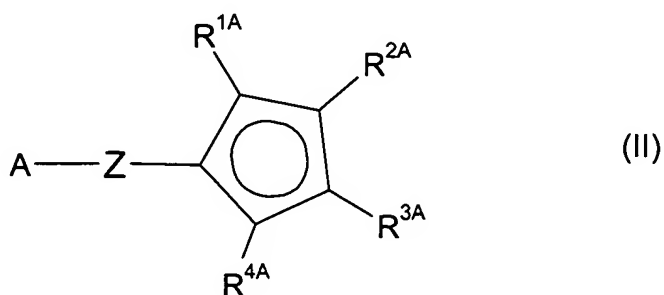
Notwithstanding, for a reference to anticipate an invention, all of the elements of that invention must be present in the reference. The test for anticipation under section 102 is whether each and every element as set forth in the claims is found, either expressly or inherently, in a single prior art reference. *Verdegaal Bros. V. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989) (Emphasis added). The elements must also be arranged as required by the claim. *In re Bond*, 15

USPQ2d 1566 (Fed. Cir. 1990).

Applicant respectfully believes WO 01/92346 (referred to herein as Wang) fails to disclose, teach, or suggest, "A process for preparing ethylene copolymers comprising a molar mass distribution  $M_w/M_n$  of from 1 to 8, a density of from 0.85 to 0.94 g/cm<sup>3</sup>, a molar mass  $M_n$  of from 10 000 g/mol to 4 000 000 g/mol, a CDBI of less than 50%, the copolymer comprising at least a bimodal short chain branching distribution, and wherein a side chain branching of the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the copolymer of ethylene and the  $\alpha$ -olefins is greater than 5 CH<sub>3</sub>/1 000 carbon atoms, the process comprising polymerizing ethylene with  $\alpha$ -olefins in presence of the following components:

A) at least one monocyclopentadienyl complex comprising a structural feature of a formula (Cp-Z-A)Cr (I), where the variables have the following meanings:

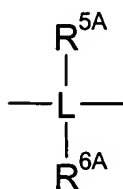
Cp-Z-A is a ligand of the formula (II):



where

$R^{1A}-R^{4A}$  are each, independently of one another, hydrogen,  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part,  $NR^{11A}_2$ ,  $N(SiR^{11A}_3)_2$ ,  $OR^{11A}$ ,  $OSiR^{11A}_3$ ,  $SiR^{11A}_3$ ,  $BR^{11A}_2$ , where the organic radicals  $R^{1A}-R^{4A}$  may also be substituted by halogens and where at least two of the vicinal radicals  $R^{1A}-R^{4A}$  are joined to form a five- or six-membered ring, and/or two vicinal radicals  $R^{1A}-R^{4A}$  are joined to form a heterocycle which contains at least one atom from the group consisting of N, P, O and S;

Z is a bridge between A and Cp having the formula:

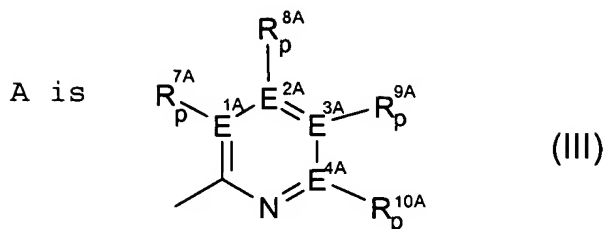


where

L is carbon or silicon,

$R^{5A}, R^{6A}$  are each hydrogen,  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11A}_3$ , where the organic radicals  $R^{5A}$  and  $R^{6A}$  may also be substituted by halogens and  $R^{5A}$  and  $R^{6A}$

may also be joined to form a five- or six-membered ring;



where

$E^{1A}-E^{4A}$  are each carbon or nitrogen,

$R^{7A}-R^{10A}$  are each, independently of one another, hydrogen,  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11A}_3$ , where the organic radicals  $R^{7A}-R^{10A}$  may also bear halogens or nitrogen or further  $C_1-C_{20}$ -alkyl groups,  $C_2-C_{20}$ -alkenyl groups,  $C_6-C_{20}$ -aryl groups, alkylaryl groups having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11A}_3$  as substituents and two vicinal radicals  $R^{7A}-R^{10A}$  or  $R^{7A}$  and Z may also be joined to form a five- or six-membered ring,

$R^{11A}$  are each, independently of one another, hydrogen,  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two

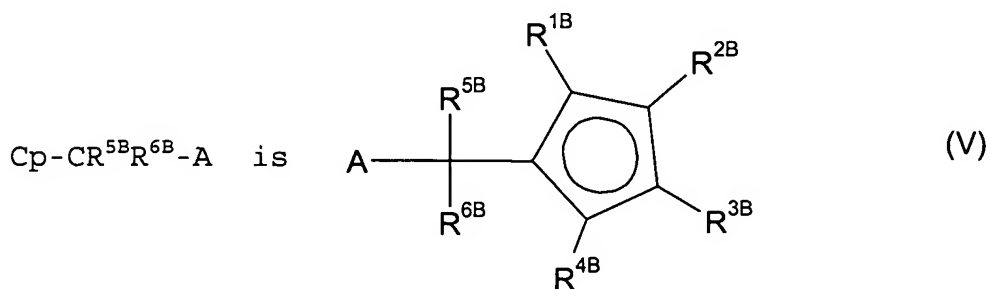
geminal radicals  $R^{1A}$  may also be joined to form a five- or six-membered ring, and

p is 0 when  $E^{1A}-E^{4A}$  is nitrogen and is 1 when  $E^{1A}-E^{4A}$  is carbon;

- B) optionally an organic or inorganic support;
- C) optionally at least one activating compound; and
- D) optionally at least one metal compound containing a metal of group 1, 2 or 13 of the Periodic Table."

Additionally, Applicant believes Wang fails to disclose, teach, or suggest, "A catalyst system for olefin polymerization comprising

A') at least one monocyclopentadienyl complex A') comprising the structural feature of a formula  $(Cp-CR^{5B}R^{6B}-A)Cr$  (IV), where the variables have the following meanings:



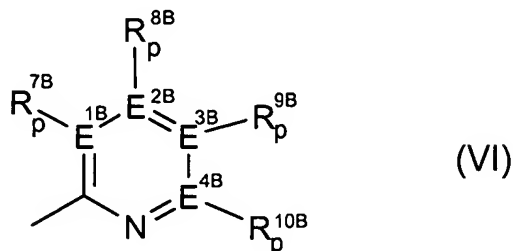
where

$R^{1B}-R^{4B}$  are each, independently of one another, hydrogen,  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl radical and 6-20 carbon atoms in the aryl radical,  $NR^{5A}_2$ ,  $N(SiR^{11B}_3)_2$ ,  $OR^{11B}$ ,  $OSiR^{11B}_3$ ,  $SiR^{11B}_3$ ,  $BR^{11B}_2$ , where the organic radicals  $R^{1B}-R^{4B}$

may also be substituted by halogens and two vicinal radicals  $R^{1B}-R^{4B}$  may also be joined to form a five- or six-membered ring,

$R^{5B}, R^{6B}$  are each hydrogen or methyl;

A is



where

$E^{1B}-E^{4B}$  are each carbon or nitrogen,

$R^{7B}-R^{10B}$  are each, independently of one another, hydrogen,  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11B}_3$ , where the organic radicals  $R^{7B}-R^{10B}$  may also bear halogens or nitrogen or further  $C_1-C_{20}$ -alkyl groups,  $C_2-C_{20}$ -alkenyl groups,  $C_6-C_{20}$ -aryl groups, alkylaryl groups having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11B}_3$  as substituents and two vicinal radicals  $R^{7B}-R^{10B}$  may also be joined to form a five- or six-membered ring,

$R^{11B}$  are each, independently of one another, hydrogen,  $C_1$ - $C_{20}$ -alkyl,  $C_2$ - $C_{20}$ -alkenyl,  $C_6$ - $C_{20}$ -aryl or alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals  $R^{11B}$  may also be joined to form a five- or six-membered ring,

$p$  is 0 when  $E^{1B}$ - $E^{4B}$  is nitrogen and is 1 when  $E^{1B}$ - $E^{4B}$  is carbon,

where at least one radical  $R^{7B}$ - $R^{10B}$  is  $C_1$ - $C_{20}$ -alkyl,  $C_2$ - $C_{20}$ -alkenyl,  $C_6$ - $C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11B}_3$  and the organic radicals  $R^{7B}$ - $R^{10B}$  may also bear halogens or nitrogen or further  $C_1$ - $C_{20}$ -alkyl groups,  $C_2$ - $C_{20}$ -alkenyl groups,  $C_6$ - $C_{20}$ -aryl groups, alkylaryl groups having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{5C}_3$  as substituents and two vicinal radicals  $R^{7B}$ - $R^{10B}$  may also be joined to form a five- or six-membered ring or at least one  $E^{1B}$ - $E^{4B}$  is nitrogen;

- B) optionally an organic or inorganic support;
- C) optionally at least one activating compound; and
- D) optionally at least one metal compound containing a metal of group 1, 2 or 13 of the Periodic Table,

wherein the catalyst system produces a copolymer of ethylene with  $\alpha$ -olefins which comprises a molar mass distribution  $M_w/M_n$  of from 1 to 8, a density of from 0.85 to 0.94 g/cm<sup>3</sup>, a molar mass  $M_n$

of from 10 000 g/mol to 4 000 000 g/mol, a CDBI of less than 50%, the copolymer comprising at least a bimodal short chain branching distribution, and wherein a side chain branching of the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the copolymer of ethylene and the  $\alpha$ -olefins is greater than 5 CH<sub>3</sub>/1 000 carbon atoms."

In particular, Applicant believes Wang fails to disclose, teach, or suggest a process or catalyst system for producing ethylene copolymers comprising a molar mass distribution  $M_w/M_n$  of from 1 to 8, a density of from 0.85 to 0.94 g/cm<sup>3</sup>, a molar mass  $M_n$  of from 10 000 g/mol to 4 000 000 g/mol, a CDBI of less than 50%, the copolymer comprising at least a bimodal short chain branching distribution, and wherein a side chain branching of the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the copolymer of ethylene and the  $\alpha$ -olefins is greater than 5 CH<sub>3</sub>/1 000 carbon atoms. See MPEP 2131.

The Examiner refers to the catalyst in Example 5 (i.e., 2-pyridylmethyl(Ind)CrCl<sub>2</sub>) in Wang, which was used to polymerize ethylene homopolymers, the properties of which are disclosed in Table I and II on page 21. However, as disclosed in Wang, the catalyst in Example 5 was used to produce ethylene homopolymers having a density of 0.955 g/cc and a MWD of 10.6. However, Applicant is currently claiming, ethylene copolymers comprising a

molar mass distribution  $M_w/M_n$  of from 1 to 8, and a density of from 0.85 to 0.94 g/cm<sup>3</sup>.

In light of the above, claims 16-29 are therefore believed to be patentable over Wang. Accordingly, reconsideration and withdrawal of the rejection is requested.

**7. Rejection of Claim 9 Under 35 U.S.C. §103(a)**

The Office Action states that claim 9 is rejected under 35 U.S.C. §103(a) as being unpatentable over Wang (WO 01/92346) in view of Welch, et al. (U.S. 5,498,581). In particular, the Office Action states,

Wang contemplates that inventive catalysts may be in the form of prepolymer (page 10, lines 22-29), but there is not teaching as to how this type of catalyst is made. Welch et al. teaches that 5-80 wt % of prepolymer relative to the mass of resulting prepolymerized solid catalyst system is a practical working range for transition metal catalyzed olefin polymerizations. It would have been obvious to one having ordinary skill in the art to use the amount taught by Welch et al. in making the prepolymer disclosed in Wang because this has been shown to produce useful catalysts, and consequently, the skilled artisan would have expected such an embodiment to work. The combination is obvious since both patents relate to olefin polymerization processes.

**RESPONSE**

Claim 9 has been cancelled rendering the above rejection moot. Notwithstanding, the U.S. Supreme Court in *Graham v. John Deere Co.*, 148 U.S.P.Q. 459 (1966) held that non-obviousness was determined under § 103 by (1) determining the scope and content of the prior art; (2) ascertaining the differences between the prior art and the

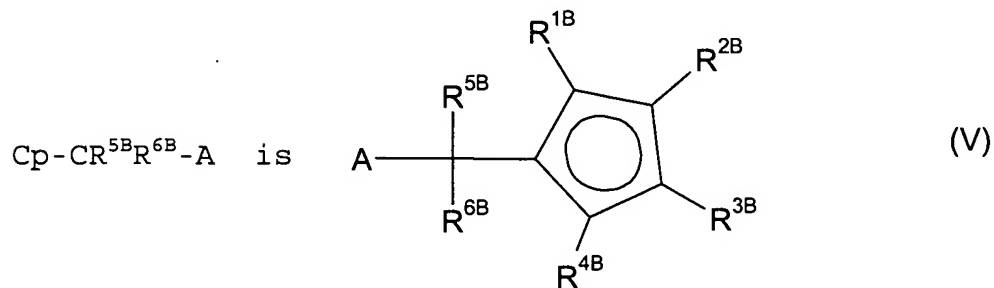
claims at issue; (3) resolving the level of ordinary skill in the art; and, (4) inquiring as to any objective evidence of non-obviousness.

To establish a *prima facie* case of obviousness, the Examiner must establish: (1) that some suggestion or motivation to modify the references exists; (2) a reasonable expectation of success; and (3) that the prior art references teach or suggest all the claim limitations. Amgen, Inc. v. Chugai Pharm. Co., 18 USPQ2d 1016, 1023 (Fed. Cir. 1991); In re Fine, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); In re Wilson, 165 USPQ 494, 496 (C.C.P.A. 1970).

Further, the Examiner needs to show basis for combining the references to properly set forth a *prima facie* case of obviousness. The combination of the references taught every element of the claimed invention, however without a motivation to combine, a rejection based on a *prima facie* case of obvious was held improper; In re Rouffet, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998). The level of skill in the art cannot be relied upon to provide the suggestion to combine references. Al-Site Corp. v. VSI Int'l Inc., 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999). (Emphasis added) See MPEP 2143.01.

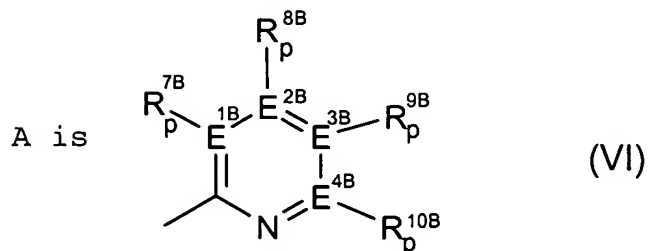
Applicant respectfully believes WO 01/92346 (referred to herein as Wang) fails to disclose, teach, or suggest, "A prepolymerized catalyst system comprising a catalyst system comprising:

A') at least one monocyclopentadienyl complex A') comprising the structural feature of a formula (Cp- CR<sup>5B</sup>R<sup>6B</sup> - A)Cr (IV), where the variables have the following meanings:



where

R<sup>1B</sup>-R<sup>4B</sup> are each, independently of one another, hydrogen, C<sub>1</sub>-C<sub>20</sub>-alkyl, C<sub>2</sub>-C<sub>20</sub>-alkenyl, C<sub>6</sub>-C<sub>20</sub>-aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl radical and 6-20 carbon atoms in the aryl radical, NR<sup>5A</sup><sub>2</sub>, N(SiR<sup>11B</sup><sub>3</sub>)<sub>2</sub>, OR<sup>11B</sup>, OSiR<sup>11B</sup><sub>3</sub>, SiR<sup>11B</sup><sub>3</sub>, BR<sup>11B</sup><sub>2</sub>, where the organic radicals R<sup>1B</sup>-R<sup>4B</sup> may also be substituted by halogens and two vicinal radicals R<sup>1B</sup>-R<sup>4B</sup> may also be joined to form a five- or six-membered ring, R<sup>5B</sup>, R<sup>6B</sup> are each hydrogen or methyl;



where

E<sup>1B</sup>-E<sup>4B</sup> are each carbon or nitrogen,

$R^{7B}-R^{10B}$  are each, independently of one another, hydrogen,  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11B}_3$ , where the organic radicals  $R^{7B}-R^{10B}$  may also bear halogens or nitrogen or further  $C_1-C_{20}$ -alkyl groups,  $C_2-C_{20}$ -alkenyl groups,  $C_6-C_{20}$ -aryl groups, alkylaryl groups having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11B}_3$  as substituents and two vicinal radicals  $R^{7B}-R^{10B}$  may also be joined to form a five- or six-membered ring,

$R^{11B}$  are each, independently of one another, hydrogen,  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl or alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals  $R^{11B}$  may also be joined to form a five- or six-membered ring,

p is 0 when  $E^{1B}-E^{4B}$  is nitrogen and is 1 when  $E^{1B}-E^{4B}$  is carbon,

where at least one radical  $R^{7B}-R^{10B}$  is  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11B}_3$  and the organic radicals  $R^{7B}-R^{10B}$  may also bear halogens or nitrogen or further  $C_1-C_{20}$ -alkyl groups,  $C_2-C_{20}$ -

alkenyl groups, C<sub>6</sub>-C<sub>20</sub>-aryl groups, alkylaryl groups having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR<sup>5C</sup><sub>3</sub> as substituents and two vicinal radicals R<sup>7B</sup>-R<sup>10B</sup> may also be joined to form a five- or six-membered ring or at least one E<sup>1B</sup>-E<sup>4B</sup> is nitrogen;

- A) optionally an organic or inorganic support;
- B) optionally at least one activating compound; and
- C) optionally at least one activating compound containing a metal of group 1, 2 or 13 of the Periodic Table;

and linear C<sub>2</sub>-C<sub>10</sub>-1-alkenes polymerized onto the catalyst system, wherein the catalyst system to polymer polymerized onto the catalyst system is in a mass ratio of from 1:0.1 to 1:200; and wherein the prepolymerized catalyst system produces a copolymer of ethylene with  $\alpha$ -olefins which comprises a molar mass distribution M<sub>w</sub>/M<sub>n</sub> of from 1 to 8, a density of from 0.85 to 0.94 g/cm<sup>3</sup>, a molar mass M<sub>n</sub> of from 10 000 g/mol to 4 000 000 g/mol, a CDBI of less than 50%, the copolymer comprising at least a bimodal short chain branching distribution, and wherein a side chain branching of the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the copolymer of ethylene and the  $\alpha$ -olefins is greater than 5 CH<sub>3</sub>/1 000 carbon atoms."

Wang has been discussed *supra*, which is incorporated herein by

reference in its entirety. Welch, et al. does not remedy the deficiencies of Wang.

In particular, Welch et al., as with Wang, fails to disclose, teach, or suggest, "wherein the prepolymerized catalyst system produces a copolymer of ethylene with  $\alpha$ -olefins which comprises a molar mass distribution  $M_w/M_n$  of from 1 to 8, a density of from 0.85 to 0.94 g/cm<sup>3</sup>, a molar mass  $M_n$  of from 10 000 g/mol to 4 000 000 g/mol, a CDBI of less than 50%, the copolymer comprising at least a bimodal short chain branching distribution, and wherein a side chain branching of the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the copolymer of ethylene and the  $\alpha$ -olefins is greater than 5 CH<sub>3</sub>/1 000 carbon atoms." See MPEP 2143.03.

In addition to not disclosing, teaching, or suggesting Applicant's currently claimed copolymer of ethylene with  $\alpha$ -olefins as discussed *supra*, Applicant traverses the Examiner's combination of Wang and Welch, et al. given Welch, et al. discloses a completely different genus of metallocenes than those disclosed in Wang. In particular, Welch, et al. discloses a solid particulate metallocene catalyst system having at least one cyclopentadienyl-type type ligand and at least one olefinic unsaturated substituent, whereas Wang discloses metallocenes having C<sub>1</sub>-C<sub>8</sub> hydrocarbyl groups, which are preferably selected from branched or unbranched alkyl groups, attached to the cyclopentadienyl group and/or bridge. See col. 1,

lines 14 - 17 and lines 61 - 66, and col. 2, lines 44 - 49 in Welch, et al. and page 4, line 20 - page 6, line 1 in Wang. Accordingly, given the two genus of metallocenes disclosed by Wang and Welch, et al. are vastly different, there is no motivation to combine Wang and Welch, et al. See MPEP 2143.01 III, 2143.01 IV, 2145 XA, 2145 XB, and 2145 XC.

Moreover, Applicant traverses the Examiner using Welch, et al. all together, given the metallocene catalyst system of Welch, et al. is disclosed as being typically directed towards a system having a metallocene compound comprising zirconium or hafnium, and not chromium as currently claimed by Applicant. See col. 3, line 54 - col. 4, line 12.

In light of the above, claims 16-29 are therefore believed to be patentable over Wang in view of Welch, et al. Accordingly, reconsideration and withdrawal of the rejection is requested.

#### 8. Rejection of Claims 1, 2, 4, 13, and 14 Under 35 U.S.C.

##### §103(a)

The Office Action states that claims 1, 2, 4, 13, and 14 are rejected under 35 U.S.C. §103(a) as being unpatentable over Stehling, et al. (U.S. Patent 5,382,630). In particular, the Office Action states,

Stehling et al. teaches a film (molded sheet of 0.0005 inch thickness) comprising an ethylene copolymer comprising a 50/50 blend of HDPE and LLDPE which exhibits  $M_w/M_n$  of 2.4, a density of 0.9335 g/cm<sup>3</sup>,  $M_w$  of 76,500, and CDBI of 25% (col. 12, lines 4 and 12-15; Table I). The reference is silent

with respect to the branching properties, however, in view of the fact that all other properties are met, a reasonable basis exists to believe that the claimed material also exhibits the claimed branching properties. Since the PTO can not perform experiments, the burden is shifted to the Applicants to establish an unobviousness difference. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The patent does not disclose further blends, however, one of ordinary skill in the art would have found it obvious to use the material in a blend as this is routine practice in the art, and because Stehling et al. relates to making polymer blends.

#### RESPONSE

Claims 1, 2, 4, 13, and 14 have been cancelled rendering the above rejection moot. Notwithstanding, the U.S. Supreme Court in *Graham v. John Deere Co.*, 148 U.S.P.Q. 459 (1966) held that non-obviousness was determined under § 103 by (1) determining the scope and content of the prior art; (2) ascertaining the differences between the prior art and the claims at issue; (3) resolving the level of ordinary skill in the art; and, (4) inquiring as to any objective evidence of non-obviousness.

To establish a *prima facie* case of obviousness, the Examiner must establish: (1) that some suggestion or motivation to modify the references exists; (2) a reasonable expectation of success; and (3) that the prior art references teach or suggest all the claim limitations. Amgen, Inc. v. Chugai Pharm. Co., 18 USPQ2d 1016, 1023 (Fed. Cir. 1991); In re Fine, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); In re Wilson, 165 USPQ 494, 496 (C.C.P.A. 1970).

Applicant respectfully believes U.S. Patent 5,382,630 (referred

to herein as Stehling, et al.) fails to disclose, teach, or suggest, "A copolymer of ethylene with  $\alpha$ -olefins which comprises a molar mass distribution  $M_w/M_n$  of from 1 to 8, a density of from 0.85 to 0.94 g/cm<sup>3</sup>, a molar mass  $M_n$  of from 10 000 g/mol to 4 000 000 g/mol, a CDBI of less than 50%, the copolymer comprising at least a bimodal short chain branching distribution, and wherein a side chain branching of the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the copolymer of ethylene and the  $\alpha$ -olefins is greater than 5 CH<sub>3</sub>/1 000 carbon atoms."

Additionally, Applicant respectfully believes Stehling, et al. fails to disclose, teach, or suggest, "A polymer mixture comprising

(E) from 1 to 99% by weight of at least one ethylene copolymer comprising a molar mass distribution  $M_w/M_n$  of from 1 to 8, a density of from 0.85 to 0.94 g/cm<sup>3</sup>, a molar mass  $M_n$  of from 10 000 g/mol to 4 000 000 g/mol, a CDBI of less than 50%, the copolymer comprising at least a bimodal short chain branching distribution, and wherein a side chain branching of the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the ethylene copolymer is greater than 5 CH<sub>3</sub>/1 000 carbon atoms; and

(F) from 1 to 99% by weight of a polymer which is different from (E),

where the percentages by weight are based on the total mass of the

polymer mixture."

Moreover, Applicant respectfully believes Stehling, et al. fails to disclose, teach, or suggest, "A fiber, film or molding comprising an ethylene copolymer comprising a molar mass distribution  $M_w/M_n$  of from 1 to 8, a density of from 0.85 to 0.94 g/cm<sup>3</sup>, a molar mass  $M_n$  of from 10 000 g/mol to 4 000 000 g/mol, a CDBI of less than 50%, the copolymer comprising at least a bimodal short chain branching distribution, and wherein a side chain branching of the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the ethylene copolymer is greater than 5 CH<sub>3</sub>/1 000 carbon atoms."

In particular, Applicant believes Stehling, et al. fails to disclose, teach, or suggest an ethylene copolymer comprising, "at least a bimodal short chain branching distribution, and wherein a side chain branching of the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the ethylene copolymer is greater than 5 CH<sub>3</sub>/1 000 carbon atoms."

Applicant traverses the Examiner contention the samples disclosed in Stehling, et al. discloses all of the claimed properties except the branching properties, with there being a reasonable basis to believe that the disclosed material also exhibit the claimed branching properties.

Applicant is currently claiming a (i) copolymer of ethylene

with  $\alpha$ -olefins, (ii) a polymer mixture comprising at least one ethylene copolymer and a polymer different from the ethylene copolymer, and (iii) a fiber, film or molding comprising an ethylene copolymer with  $\alpha$ -olefins, wherein all (i) - (iii) comprise a CDBI of less than 50%, and a side chain branching of the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the ethylene copolymer and  $\alpha$ -olefins or other polymer is greater than 5 CH<sub>3</sub>/1 000 carbon atoms. Thus, the ethylene copolymer must comprise a CDBI of less than 50%, and both the ethylene copolymer, and the  $\alpha$ -olefins or the other polymer, must have the claimed branching properties.

However, two of the samples disclosed in Stehling, et al. (i.e., samples with designation '006 and '013) have CDBI percentages greater than 50%. See col. 12, Table I, lines 22 - 23. Additionally, it is important to note, sample '006 is disclosed as an ethylene homopolymer resin.

The other two samples disclosed in Stehling, et al. (i.e., Blend B1 and Blend B2) both comprise 50% or 25%, respectively, of sample '006, which is an ethylene homopolymer resin. See col. 11, line 62 - col. 12, line 2, and col. 12, lines 15 - 16.

Accordingly, Applicant believes since sample '006 is a homopolymer, the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), is necessarily smaller than 5 CH<sub>3</sub>/1000

carbon atoms. This is due to the homopolymeric nature of the sample '006. Thus, since Blend B1 and Blend B2 both comprise a portion of sample '006, the blends cannot have the currently recited branching limitations, which as pointed out above, each constituent must have.

"To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). (Emphasis added) See MPEP 2163.07(a).

In light of the above, claims 16-29 are therefore believed to be patentable over Stehling, et al. Accordingly, reconsideration and withdrawal of the rejection is requested.

#### 9. Rejection of Claims 6-8, 10-12, and 15 Under 35 U.S.C. §103(a)

The Office Action states that claims 6-8, 10-12, and 15 are rejected under 35 U.S.C. §103(a) as being unpatentable over Mihan, et al. (WO 01/12641). In particular, the Office Action states,

Mihan et al. teaches a general catalyst system comprising (un)substituted monocyclopentadienyl chromium (III) complexes. The transition metal component has structure defined by structural components (I) and (II), as shown on page 6. One notes that the  $\pi$ -ligand has bridging group B and pendant moiety Z. The bridging group is of formula  $L^2(R^{13})(R^{14})$  where  $L^2$  is carbon or silicon. Z is a

heterocyclic moiety, and page 8 shows that this is a 2-pyridyl or 8-quinolyl group, and substituted derivatives thereof are preferred (page 8, line 45-47). Surprisingly, the examples of Mihan et al. do not show a single organometallic complex containing the requisite bridging group  $L^2(R^{13})(R^{14})$ , as disclosed in the body of the patent. There is disclosed the complexes (8-quinolyl)(Ind)CrCl<sub>2</sub> and (2-Me-8-quinolyl)(Me<sub>4</sub>C<sub>5</sub>)CrCl<sub>2</sub> in examples 8 and 10, where the quinolyl moiety is bound directly to the Cp ligand, but no bridging group exists in either complex (see experimental and supporting <sup>1</sup>H NMR data). Despite this, one of ordinary skill in the art would have found it obvious to follow the teachings of the disclosure and claims and make the corresponding bridged derivatives of these compounds because this is the actual scope of the disclosure of the patent. Thus, one of ordinary skill in the art would have found it obvious to make  $[L^2(R^{13})(R^{14})](8\text{-quinolyl})(\text{Ind})\text{CrCl}_2$  and  $[L^2(R^{13})(R^{14})](2\text{-Me-8-quinolyl})(\text{Cp})\text{CrCl}_2$  and thereby arrive at the catalyst of the instant claims, and since the patent teaches use of catalysts in a process of polymerizing olefins, the skilled artisan also would have found it obvious to do likewise with the catalyst comprising the bridged derivative. One of ordinary skill in the art also would have found it obvious to arrive at the claimed process using a substituted 2-pyridyl analogue because Mihan et al. teaches such an embodiment (see page 8, structure in line 5, and discussion lines 45 - 47). Obviously, Mihan et al. does not show a polymer product derived from the catalysts claimed in the text, however, a reasonable basis exists to believe that the product would exhibit the properties recited in instant claim 11 because the catalyst disclosed by Mihan et al. and the polymerization process using the catalyst is essentially the same as that recited in the instant claims. Since the PTO can not perform experiments, the burden is shifted to the Applicants to establish an unobviousness difference. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

#### RESPONSE

Claims 6-8, 10-12, and 15 have been cancelled rendering the above rejection moot. Notwithstanding, the U.S. Supreme Court in *Graham v. John Deere Co.*, 148 U.S.P.Q. 459 (1966) held that non-

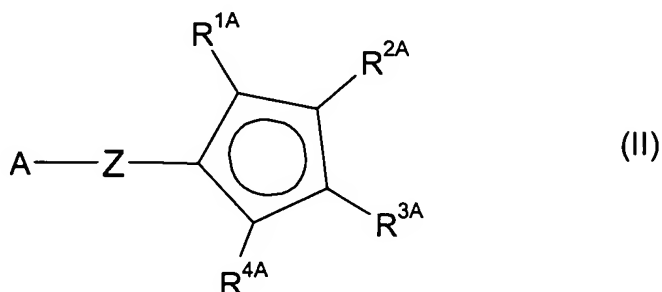
obviousness was determined under § 103 by (1) determining the scope and content of the prior art; (2) ascertaining the differences between the prior art and the claims at issue; (3) resolving the level of ordinary skill in the art; and, (4) inquiring as to any objective evidence of non-obviousness.

To establish a *prima facie* case of obviousness, the Examiner must establish: (1) that some suggestion or motivation to modify the references exists; (2) a reasonable expectation of success; and (3) that the prior art references teach or suggest all the claim limitations. Amgen, Inc. v. Chugai Pharm. Co., 18 USPQ2d 1016, 1023 (Fed. Cir. 1991); In re Fine, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); In re Wilson, 165 USPQ 494, 496 (C.C.P.A. 1970).

Applicant respectfully believes WO 01/12641 (referred to herein as Mihan, et al.) fails to disclose, teach, or suggest, "A process for preparing ethylene copolymers comprising a molar mass distribution  $M_w/M_n$  of from 1 to 8, a density of from 0.85 to 0.94 g/cm<sup>3</sup>, a molar mass  $M_n$  of from 10 000 g/mol to 4 000 000 g/mol, a CDBI of less than 50%, the copolymer comprising at least a bimodal short chain branching distribution, and wherein a side chain branching of the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the copolymer of ethylene and the  $\alpha$ -olefins is greater than 5 CH<sub>3</sub>/1 000 carbon atoms, the process comprising polymerizing ethylene with  $\alpha$ -olefins in presence of the following components:

A) at least one monocyclopentadienyl complex comprising a structural feature of a formula (Cp-Z-A)Cr (I), where the variables have the following meanings:

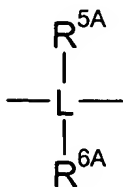
Cp-Z-A is a ligand of the formula (II):



where

$R^{1A}$ - $R^{4A}$  are each, independently of one another, hydrogen,  $C_1$ - $C_{20}$ -alkyl,  $C_2$ - $C_{20}$ -alkenyl,  $C_6$ - $C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part,  $NR^{11A}_2$ ,  $N(SiR^{11A}_3)_2$ ,  $OR^{11A}$ ,  $OSiR^{11A}_3$ ,  $SiR^{11A}_3$ ,  $BR^{11A}_2$ , where the organic radicals  $R^{1A}$ - $R^{4A}$  may also be substituted by halogens and where at least two of the vicinal radicals  $R^{1A}$ - $R^{4A}$  are joined to form a five- or six-membered ring, and/or two vicinal radicals  $R^{1A}$ - $R^{4A}$  are joined to form a heterocycle which contains at least one atom from the group consisting of N, P, O and S;

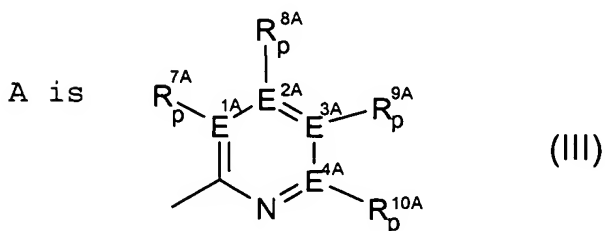
Z is a bridge between A and Cp having the formula:



where

L is carbon or silicon,

$R^{5A}, R^{6A}$  are each hydrogen,  $C_1$ - $C_{20}$ -alkyl,  $C_2$ - $C_{20}$ -alkenyl,  $C_6$ - $C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11A}_3$ , where the organic radicals  $R^{5A}$  and  $R^{6A}$  may also be substituted by halogens and  $R^{5A}$  and  $R^{6A}$  may also be joined to form a five- or six-membered ring;



where

$E^{1A}-E^{4A}$  are each carbon or nitrogen,

$R^{7A}-R^{10A}$  are each, independently of one another, hydrogen,  $C_1$ - $C_{20}$ -alkyl,  $C_2$ - $C_{20}$ -alkenyl,  $C_6$ - $C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11A}_3$ , where the organic radicals  $R^{7A}-R^{10A}$  may also bear halogens or nitrogen or further  $C_1$ - $C_{20}$ -alkyl groups,  $C_2$ - $C_{20}$ -alkenyl groups,  $C_6$ - $C_{20}$ -aryl groups, alkylaryl groups having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11A}_3$  as substituents and two vicinal radicals  $R^{7A}-$

$R^{10A}$  or  $R^{7A}$  and Z may also be joined to form a five- or six-membered ring,

$R^{11A}$  are each, independently of one another, hydrogen,  $C_1$ - $C_{20}$ -alkyl,  $C_2$ - $C_{20}$ -alkenyl,  $C_6$ - $C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two geminal radicals  $R^{11A}$  may also be joined to form a five- or six-membered ring, and

p is 0 when  $E^{1A}$ - $E^{4A}$  is nitrogen and is 1 when  $E^{1A}$ - $E^{4A}$  is carbon;

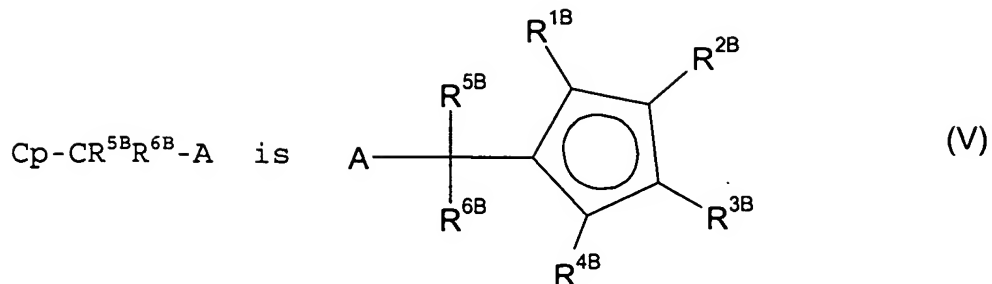
B) optionally an organic or inorganic support;

C) optionally at least one activating compound; and

D) optionally at least one metal compound containing a metal of group 1, 2 or 13 of the Periodic Table."

Additionally, Applicant believes Mihan, et al. fails to disclose, teach, or suggest, "A catalyst system for olefin polymerization comprising

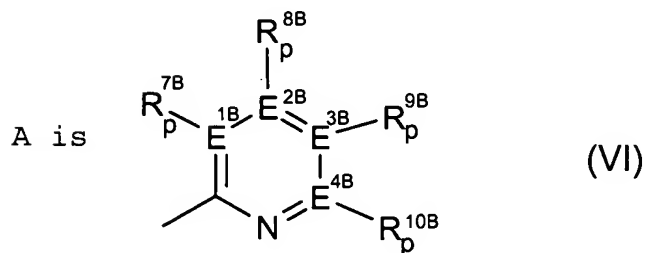
A') at least one monocyclopentadienyl complex A') comprising the structural feature of a formula  $(Cp-CR^{5B}R^{6B}-A)Cr$  (IV), where the variables have the following meanings:



where

$\text{R}^{1\text{B}}\text{-R}^{4\text{B}}$  are each, independently of one another, hydrogen,  $\text{C}_1\text{-C}_{20}\text{-alkyl}$ ,  $\text{C}_2\text{-C}_{20}\text{-alkenyl}$ ,  $\text{C}_6\text{-C}_{20}\text{-aryl}$ , alkylaryl having from 1 to 10 carbon atoms in the alkyl radical and 6-20 carbon atoms in the aryl radical,  $\text{NR}^{5\text{A}}_2$ ,  $\text{N}(\text{SiR}^{11\text{B}}_3)_2$ ,  $\text{OR}^{11\text{B}}$ ,  $\text{OSiR}^{11\text{B}}_3$ ,  $\text{SiR}^{11\text{B}}_3$ ,  $\text{BR}^{11\text{B}}_2$ , where the organic radicals  $\text{R}^{1\text{B}}\text{-R}^{4\text{B}}$  may also be substituted by halogens and two vicinal radicals  $\text{R}^{1\text{B}}\text{-R}^{4\text{B}}$  may also be joined to form a five- or six-membered ring,

$\text{R}^{5\text{B}}, \text{R}^{6\text{B}}$  are each hydrogen or methyl;



where

$\text{E}^{1\text{B}}\text{-E}^{4\text{B}}$  are each carbon or nitrogen,

$\text{R}^{7\text{B}}\text{-R}^{10\text{B}}$  are each, independently of one another, hydrogen,  $\text{C}_1\text{-C}_{20}\text{-alkyl}$ ,  $\text{C}_2\text{-C}_{20}\text{-alkenyl}$ ,  $\text{C}_6\text{-C}_{20}\text{-aryl}$ , alkylaryl

having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $\text{SiR}^{11\text{B}}_3$ , where the organic radicals  $\text{R}^{7\text{B}}\text{-R}^{10\text{B}}$  may also bear halogens or nitrogen or further  $\text{C}_1\text{-C}_{20}$ -alkyl groups,  $\text{C}_2\text{-C}_{20}$ -alkenyl groups,  $\text{C}_6\text{-C}_{20}$ -aryl groups, alkylaryl groups having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $\text{SiR}^{11\text{B}}_3$  as substituents and two vicinal radicals  $\text{R}^{7\text{B}}\text{-R}^{10\text{B}}$  may also be joined to form a five- or six-membered ring,

$\text{R}^{11\text{B}}$  are each, independently of one another, hydrogen,  $\text{C}_1\text{-C}_{20}$ -alkyl,  $\text{C}_2\text{-C}_{20}$ -alkenyl,  $\text{C}_6\text{-C}_{20}$ -aryl or alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals  $\text{R}^{11\text{B}}$  may also be joined to form a five- or six-membered ring,

$p$  is 0 when  $\text{E}^{1\text{B}}\text{-E}^{4\text{B}}$  is nitrogen and is 1 when  $\text{E}^{1\text{B}}\text{-E}^{4\text{B}}$  is carbon,

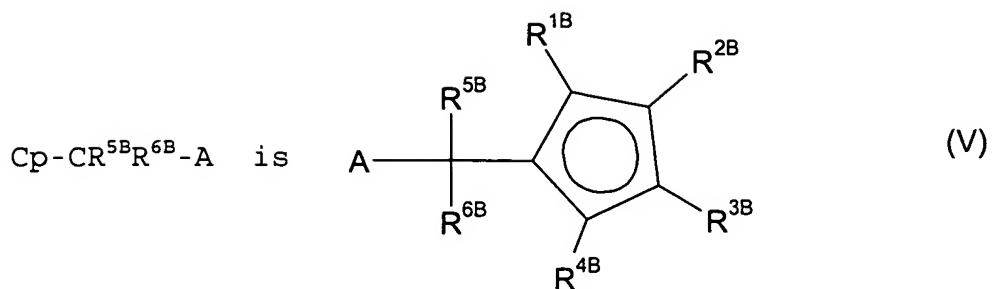
where at least one radical  $\text{R}^{7\text{B}}\text{-R}^{10\text{B}}$  is  $\text{C}_1\text{-C}_{20}$ -alkyl,  $\text{C}_2\text{-C}_{20}$ -alkenyl,  $\text{C}_6\text{-C}_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $\text{SiR}^{11\text{B}}_3$  and the organic radicals  $\text{R}^{7\text{B}}\text{-R}^{10\text{B}}$  may also bear halogens or nitrogen or further  $\text{C}_1\text{-C}_{20}$ -alkyl groups,  $\text{C}_2\text{-C}_{20}$ -alkenyl groups,  $\text{C}_6\text{-C}_{20}$ -aryl groups, alkylaryl groups having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon

atoms in the aryl part or  $\text{SiR}^{5\text{C}}_3$  as substituents and two vicinal radicals  $\text{R}^{7\text{B}}\text{-R}^{10\text{B}}$  may also be joined to form a five- or six-membered ring or at least one  $\text{E}^{1\text{B}}\text{-E}^{4\text{B}}$  is nitrogen;

- B) optionally an organic or inorganic support;
- C) optionally at least one activating compound; and
- D) optionally at least one metal compound containing a metal of group 1, 2 or 13 of the Periodic Table,

wherein the catalyst system produces a copolymer of ethylene with  $\alpha$ -olefins which comprises a molar mass distribution  $M_w/M_n$  of from 1 to 8, a density of from 0.85 to 0.94 g/cm<sup>3</sup>, a molar mass  $M_n$  of from 10 000 g/mol to 4 000 000 g/mol, a CDBI of less than 50%, the copolymer comprising at least a bimodal short chain branching distribution, and wherein a side chain branching of the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the copolymer of ethylene and the  $\alpha$ -olefins is greater than 5 CH<sub>3</sub>/1 000 carbon atoms."

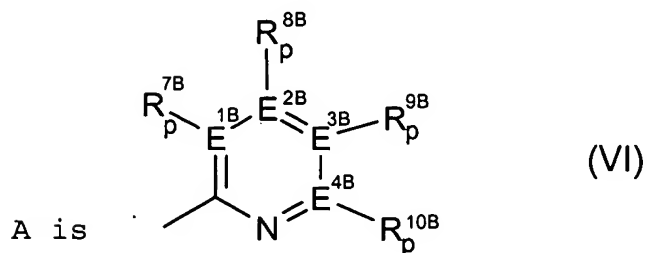
Moreover, Applicant believes Mihan, et al. fails to disclose, teach, or suggest, "A process comprising copolymerizing ethylene with  $\alpha$ -olefins in the presence of a catalyst system comprising: A') at least one monocyclopentadienyl complex A') comprising a structural feature of the formula  $(\text{Cp- CR}^{5\text{B}}\text{R}^{6\text{B}}\text{-A})\text{Cr}$  (IV), where the variables have the following meanings:



where

$\text{R}^{1\text{B}}\text{-R}^{4\text{B}}$  are each, independently of one another, hydrogen,  $\text{C}_1\text{-C}_{20}\text{-alkyl}$ ,  $\text{C}_2\text{-C}_{20}\text{-alkenyl}$ ,  $\text{C}_6\text{-C}_{20}\text{-aryl}$ , alkylaryl having from 1 to 10 carbon atoms in the alkyl radical and 6-20 carbon atoms in the aryl radical,  $\text{NR}^{5\text{A}}_2$ ,  $\text{N}(\text{SiR}^{11\text{B}}_3)_2$ ,  $\text{OR}^{11\text{B}}$ ,  $\text{OSiR}^{11\text{B}}_3$ ,  $\text{SiR}^{11\text{B}}_3$ ,  $\text{BR}^{11\text{B}}_2$ , where the organic radicals  $\text{R}^{1\text{B}}\text{-R}^{4\text{B}}$  may also be substituted by halogens and two vicinal radicals  $\text{R}^{1\text{B}}\text{-R}^{4\text{B}}$  may also be joined to form a five- or six-membered ring,

$\text{R}^{5\text{B}}, \text{R}^{6\text{B}}$  are each hydrogen or methyl;



where

$\text{E}^{1\text{B}}\text{-E}^{4\text{B}}$  are each carbon or nitrogen,

$\text{R}^{7\text{B}}\text{-R}^{10\text{B}}$  are each, independently of one another, hydrogen,  $\text{C}_1\text{-C}_{20}\text{-alkyl}$ ,  $\text{C}_2\text{-C}_{20}\text{-alkenyl}$ ,  $\text{C}_6\text{-C}_{20}\text{-aryl}$ , alkylaryl

having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $\text{SiR}^{11\text{B}}_3$ , where the organic radicals  $\text{R}^{7\text{B}}-\text{R}^{10\text{B}}$  may also bear halogens or nitrogen or further  $\text{C}_1-\text{C}_{20}$ -alkyl groups,  $\text{C}_2-\text{C}_{20}$ -alkenyl groups,  $\text{C}_6-\text{C}_{20}$ -aryl groups, alkylaryl groups having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $\text{SiR}^{11\text{B}}_3$  as substituents and two vicinal radicals  $\text{R}^{7\text{B}}-\text{R}^{10\text{B}}$  may also be joined to form a five- or six-membered ring,

$\text{R}^{11\text{B}}$  are each, independently of one another, hydrogen,  $\text{C}_1-\text{C}_{20}$ -alkyl,  $\text{C}_2-\text{C}_{20}$ -alkenyl,  $\text{C}_6-\text{C}_{20}$ -aryl or alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals  $\text{R}^{11\text{B}}$  may also be joined to form a five- or six-membered ring,

$p$  is 0 when  $\text{E}^{1\text{B}}-\text{E}^{4\text{B}}$  is nitrogen and is 1 when  $\text{E}^{1\text{B}}-\text{E}^{4\text{B}}$  is carbon,

where at least one radical  $\text{R}^{7\text{B}}-\text{R}^{10\text{B}}$  is  $\text{C}_1-\text{C}_{20}$ -alkyl,  $\text{C}_2-\text{C}_{20}$ -alkenyl,  $\text{C}_6-\text{C}_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $\text{SiR}^{11\text{B}}_3$  and the organic radicals  $\text{R}^{7\text{B}}-\text{R}^{10\text{B}}$  may also bear halogens or nitrogen or further  $\text{C}_1-\text{C}_{20}$ -alkyl groups,  $\text{C}_2-\text{C}_{20}$ -alkenyl groups,  $\text{C}_6-\text{C}_{20}$ -aryl groups, alkylaryl groups having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon

atoms in the aryl part or  $\text{SiR}^{5\text{C}}_3$  as substituents and two vicinal radicals  $\text{R}^{7\text{B}}\text{-R}^{10\text{B}}$  may also be joined to form a five- or six-membered ring or at least one  $\text{E}^{1\text{B}}\text{-E}^{4\text{B}}$  is nitrogen;

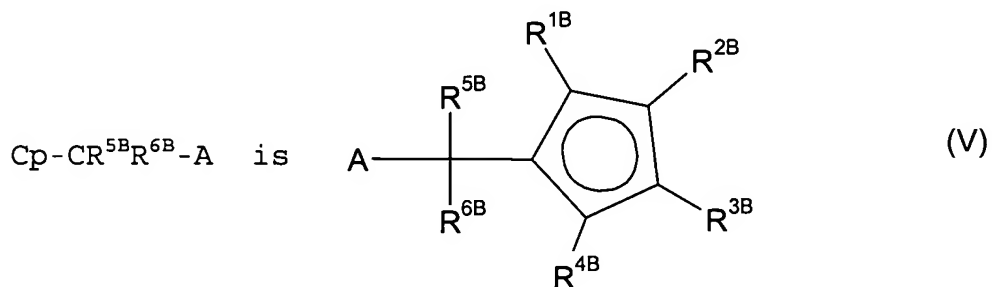
- B) optionally an organic or inorganic support;
- C) optionally at least one activating compound; and
- D) optionally at least one metal compound containing a metal of group 1, 2 or 13 of the Periodic Table;

wherein the process produces a copolymer of ethylene with  $\alpha$ -olefins which comprises a molar mass distribution  $M_w/M_n$  of from 1 to 8, a density of from 0.85 to 0.94 g/cm<sup>3</sup>, a molar mass  $M_n$  of from 10 000 g/mol to 4 000 000 g/mol, a CDBI of less than 50%, the copolymer comprising at least a bimodal short chain branching distribution, and wherein a side chain branching of the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the copolymer of ethylene and the  $\alpha$ -olefins is greater than 5 CH<sub>3</sub>/1 000 carbon atoms."

Even more so, Applicant believes Mihan, et al. fails to disclose, teach, or suggest, "A process for preparing a copolymer of ethylene with  $\alpha$ -olefins which comprises a molar mass distribution  $M_w/M_n$  of from 1 to 8, a density of from 0.85 to 0.94 g/cm<sup>3</sup>, a molar mass  $M_n$  of from 10 000 g/mol to 4 000 000 g/mol, a CDBI of less than 50%, the copolymer comprising at least a bimodal short chain branching distribution, and wherein a side chain branching of the maxima of the individual peaks of the short chain branching

distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the copolymer of ethylene and the  $\alpha$ -olefins is greater than 5 CH<sub>3</sub>/1 000 carbon atoms, the process comprising polymerizing ethylene with  $\alpha$ -olefins in presence of a catalyst system comprising:

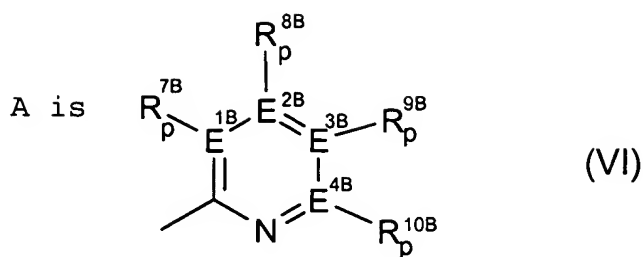
A') at least one monocyclopentadienyl complex A') comprising the structural feature of a formula (Cp- CR<sup>5B</sup>R<sup>6B</sup> -A)Cr (IV), where the variables have the following meanings:



where

R<sup>1B</sup>-R<sup>4B</sup> are each, independently of one another, hydrogen, C<sub>1</sub>-C<sub>20</sub>-alkyl, C<sub>2</sub>-C<sub>20</sub>-alkenyl, C<sub>6</sub>-C<sub>20</sub>-aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl radical and 6-20 carbon atoms in the aryl radical, NR<sup>5A</sup><sub>2</sub>, N(SiR<sup>11B</sup><sub>3</sub>)<sub>2</sub>, OR<sup>11B</sup>, OSiR<sup>11B</sup><sub>3</sub>, SiR<sup>11B</sup><sub>3</sub>, BR<sup>11B</sup><sub>2</sub>, where the organic radicals R<sup>1B</sup>-R<sup>4B</sup> may also be substituted by halogens and two vicinal radicals R<sup>1B</sup>-R<sup>4B</sup> may also be joined to form a five- or six-membered ring,

R<sup>5B</sup>, R<sup>6B</sup> are each hydrogen or methyl;



where

$E^{1B}-E^{4B}$  are each carbon or nitrogen,

$R^{7B}-R^{10B}$  are each, independently of one another, hydrogen,  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11B}_3$ , where the organic radicals  $R^{7B}-R^{10B}$  may also bear halogens or nitrogen or further  $C_1-C_{20}$ -alkyl groups,  $C_2-C_{20}$ -alkenyl groups,  $C_6-C_{20}$ -aryl groups, alkylaryl groups having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11B}_3$  as substituents and two vicinal radicals  $R^{7B}-R^{10B}$  may also be joined to form a five- or six-membered ring,

$R^{11B}$  are each, independently of one another, hydrogen,  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl or alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals  $R^{11B}$  may also be joined to form a five- or six-membered ring,

p is 0 when  $E^{1B}-E^{4B}$  is nitrogen and is 1 when  $E^{1B}-E^{4B}$  is carbon,

where at least one radical  $R^{7B}-R^{10B}$  is  $C_1-C_{20}$ -alkyl,  $C_2-C_{20}$ -alkenyl,  $C_6-C_{20}$ -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{11B}_3$  and the organic radicals  $R^{7B}-R^{10B}$  may also bear halogens or nitrogen or further  $C_1-C_{20}$ -alkyl groups,  $C_2-C_{20}$ -alkenyl groups,  $C_6-C_{20}$ -aryl groups, alkylaryl groups having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or  $SiR^{5C}_3$  as substituents and two vicinal radicals  $R^{7B}-R^{10B}$  may also be joined to form a five- or six-membered ring or at least one  $E^{1B}-E^{4B}$  is nitrogen;

- B) optionally an organic or inorganic support;
- C) optionally at least one activating compound; and
- D) optionally at least one metal compound containing a metal of group 1, 2 or 13 of the Periodic Table."

In particular, in addition to the Examiner noting the examples of Mihan, et al. do not disclose the claimed bridging group, Applicant believes Mihan, et al. fails to disclose, teach, or suggest a copolymer of ethylene or a copolymer of ethylene with  $\alpha$ -olefins which comprises a molar mass distribution  $M_w/M_n$  of from 1 to 8, a density of from 0.85 to 0.94 g/cm<sup>3</sup>, a molar mass  $M_n$  of from 10 000 g/mol to 4 000 000 g/mol, a CDBI of less than 50%, the copolymer comprising at least a bimodal short chain branching distribution, and wherein a side chain branching of the maxima of

the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF), of the copolymer of ethylene and the  $\alpha$ -olefins is greater than 5 CH<sub>3</sub>/1 000 carbon atoms. See MPEP 2143.03.

"To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). (Emphasis added) See MPEP 2163.07(a).

In light of the above, claims 16-29 are therefore believed to be patentable over Mihan, et al. Accordingly, reconsideration and withdrawal of the rejection is requested.

#### CONCLUSION

Based upon the above remarks, the presently claimed subject matter is believed to be novel and patentably distinguishable over the references of record. The Examiner is therefore respectfully requested to reconsider and withdraw all rejections and allow all pending claims 16-29. Favorable action with an early allowance of the claims pending in this application is earnestly solicited.


The Examiner is welcomed to telephone the undersigned

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practioner with any questions or comments.

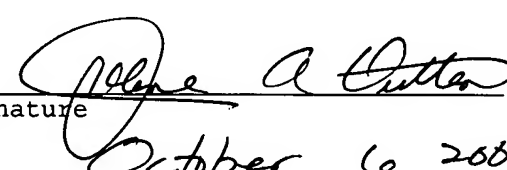
Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 on October 6 2006.

  
Signature

October 6 2006  
Date